

issuing the necessary permits, and the Australian Biological Resources Interim Council for financing the collecting trip.

REFERENCES

- HAPPOLD, M., 1976. Reproductive Biology and Developments in the Conilurine Rodents (Muridae) of Australia. *Aust. J. Zool.*, 24: 19-26.
- KEMPER, C. M., 1976. Growth and Development of the Australian Murid *Pseudomys novaehollandiae*. *Aust. J. Zool.*, 24: 27-37.
- ROBINSON, A. C., J. F. ROBINSON, C. H. S. WATTS, and P. R. BAVERSTOCK, 1976. The Shark Bay Mouse and other mammals on Bernier Island. *W. Aust. Nat.*, 13: 149-155.
- WATTS, C. H. S., 1974. The Rodents of Australia: a personal view. *Aust. J. Mamm.*, 2: 109-116.

OBSERVATIONS ON QUANDONG TREES

By Mrs. M. B. MILLS, Merredin

Part II*

1973

On September 2 the Quandongs at No. 1 group had green fruit on the trees. On the ground a number of fruits had fallen; these were smaller than the green fruits and had reddened. When opened the fruit was clean inside and free of grubs and dirt. In other trees in this group, a little farther north, though the fruits were large and had reddened and fallen to the ground, were not ripe. These trees showed little change on September 7.

The Quandong tree at the Dodder plant had green fruit on September 2, and little had fallen. On September 9 the fruits were hardening and turning yellow-green.

On September 23 a visit was made to Tantagin Rocks, about 25 miles south-east of Merredin. I was in company of Professor van Steenis and Mrs. van Steenis, from Leiden, Holland and Mr. and Mrs. Rutherford, science and language teachers at the Merredin High School. Of a number of Quandong trees near the rocks I noticed in particular two large ones, about 10 ft. high with slender main trunks. They were not compact bushy trees but had straggling much-branched limbs, like Sandalwood, *Santalum spicatum*. The leaves were slender and thin and sparse on the branches; they were not in fruit but had apparently fruited the previous season. Judged by the fallen nuts it appeared to have been a heavy crop. A large number of small Quandong trees about 3½ in. high were under the trees. When some were dug up it was seen that all had germinated from seeds and had a long almost vertical tap root, unattached to any plant or grasses. There was a heavy layer of dead moist leaves on soft reddish soil. The kernels of the nuts, when tasted raw, had a pleasant slightly sweetish taste.

At No. 1 group on September 29 the fruit was ripening. There were some very large fruits on one tree but in the other trees the fruit was still in the green stages. On October 8 the fruit in this group had ripened very quickly and appeared to be at the peak. However two small trees still had green fruit on them.

On the same day, October 8, I travelled about three miles beyond the Quandong tree at the Dodder plant and came on a large number of Quandongs in virgin country on the Old York Road. On the north side of the road, in heavy *Eucalyptus* country, were a fair number of large Quandong trees bearing green fruit. The land on the south side of the road was drier and among the *Eucalyptus* and *Acacia* were a great number, well over a hundred, of mainly young Quandongs resembling

*Continued from p. 17

an orchard. Nearly all the trees were in green fruit and fruiting was much heavier than on the trees north of the road.

On October 14 the trees in No. 1 group were loaded with ripe fruit and a large quantity was collected for cooking purposes. The fruits were very large and had a soft rather tart taste.

The Quandong tree at the Dodder plant still had green fruit on it on October 15.

By October 20 the small amount of remaining fruit at the No. 1 group was nearly all ripe, though some green fruits were still present. It had been a long wet winter and spring which had produced rain nearly every day as well as cold, cloudy conditions. This may be the reason why green fruit still persisted.

On October 28 the Quandong at the Dodder plant where the fruit had been late ripening, was now in its ripe stage. The fruits were large, dark red, smooth-skinned, nice-tasting, clean and fleshy. Other trees in the vicinity had ripening fruits. On November 5 the Quandong at the Dodder plant had ripened and there was now no fruit on the tree. Neighbouring trees had red but not quite ripe fruits.

I received a spray of Quandong leaves and ripe fruits from Dr. M. S. Buttrose, of the CSIRO Division of Horticultural Research, Adelaide. This fruit was very similar in colour and form to the fruit on the Quandong at the Dodder plant. A sample of Quandong jam received from Dr. and Mrs. Buttrose appeared to have a distinctly different flavour from our fruit and was, perhaps, of a lighter colour.

I have noted yellow-fruited Quandongs where the fruits though ripe do not become the normal bright red. Such trees occur at Merredin, Nokaning and at South Booran. Some yellow fruit picked at South Moorine Rock by a friend was fleshy and nice tasting and when cooked had the same flavour as the red Quandongs. Dr. Buttrose gave me the reason why yellow Quandongs do not redden as do other Quandongs: "These are really a variety which apparently cannot manufacture the red anthocyanin pigments of the normal Quandong, and as far as I have been able to learn they differ only in this respect. The pale Quandongs are labelled as 'Moonlight'."

On November 14 the trees at No. 1 group had finished fruiting for the season, though one or two red fruits and a few green ones still remained on some trees. The trees here and a little north were in blossom, some heavily. Some of the trees had borne fruit heavily this season. On November 15 blossom was setting on the Quandong at the Dodder plant and other trees in the vicinity.

On November 15 I re-visited the virgin area on the Old York Road. Most of the Quandongs here had fallen, ripe fruit. There had been no heavy fruiting here and all trees examined were showing blossoms. The flavour of the fruit on these trees was somewhat salty and perhaps a little bitter.

On November 18, on the Nungarin Road some five miles north of Nokaning, I picked fruit from two Quandong trees. The fruits were mainly bright red, large and tight skinned, but some were a definite yellow of a dull lemon colour. They appeared to be ripe and after being placed in the refrigerator overnight they turned an orange-red.

On December 10 I examined Quandong trees in Mr. and Mrs. Rutherford's garden. Two mature trees were heavily in blossom. Of the little Quandong trees attached to the long rooting system mentioned earlier (Part I, pp. 15-16), the one at the beginning of the root system is thriving, growing up from the small root upright into a healthy little tree. Further along the root system a small number of little trees had withered owing to Mr. Rutherford having accidentally cut through the root system with a spade while loosening the earth around other trees. The three trees which were transplanted from this root system in June had all died.

December 23: All Quandong trees through the area I have travelled are heavily in blossom; their scent is strong upon the breeze.

On January 23 the Quandong trees opposite Miss Teasdale's, on the Golf Road, Merredin, have tiny fruit setting on—one, two, or a small number, up to, on one spikelet, nine small fruits. The profusion of blossom, some still remaining but dry and falling away, did not all become fruit-bearing. The greater part blew away in the wind or was gathered by insects.

On January 28 few fruits seemed to be setting on the trees in No. 1 group. I dug around the little trees which had grown in numbers under two Quandong trees to see if they were from seed or from a root system; they were from seeds. The greater number of little trees, of about five or six inches in height, were dead or were very brown and withered. A long hot January with no cool changes and unusual cloudless skies had done havoc to them. Usually in January there are cool changes, often cloudy, with thunderstorms and rain, sometimes heavy.

On January 27 I went to a farm about seven miles south-west of Merredin to see a patch of several acres of uncleared land which had been left in its natural state there. The trees were mainly big old *Eucalyptus* with surrounding belts of mallee, some native pines and "camel box", *Alyxia buxifolia*. In this area very many Sandalwood and Quandong trees were growing very close together, about 2-3 ft. apart. Quite a number of both species had mistletoe growing on them, causing the trees to become straggly, showing dead branches. The mistletoe on the Sandalwood is very similar to the mistletoe growing on Quandong trees but lacks the vivid red colouring, the flowers being an orange-red colour. The Sandalwood mistletoe had, as well as flowers, small pale yellow oval fruits as well as smaller green fruits.

Next day, January 28, I examined the No. 1 group Quandongs. One tree in this group had sticky mistletoe seeds identical with those on the Sandalwood mistletoe.

On February 8 I examined a fine group of Quandongs on a reserve about five miles north-east of Merredin, at Gnamma rockhole. There were a large number of young trees in an area of about one acre, close together, the trees being about a few yards apart and about 5-6 ft. in height. They were very healthy looking and some had borne heavy crops of fruit, which now lay about the ground. These little trees were slightly different in leaves and colouring. The leaves were small and slender and had a curling tendency. Their colour, compared with another group of Quandongs, was paler, a yellow-green. The fruit on the ground was a deep, dark red, as yet unspoiled by rain. Some were placed in a cup of water and it was surprising how soon the fruit revived from its dehydrated state and became soft and fleshy, like a ripe Quandong still on the tree in its season—October or November. However the skin was darker from lying drying out in the sun. The water in the cup took on a rich brown-red colour also, and was not unpleasant to the taste.

In the No. 1 group no blossoms remained on May 20, and apart from a few fruits setting on the trees they were seemingly quite bare. All the previous heavy blossom had dropped off or been blown away by strong winds. The Quandong trees on the north side here had no fruit on them at all. One particular tree interested me. It seems rather barren as it has not fruited for a few years and has none this season. Yet it looks healthy and is bushy, tall and well-grown.

At the Quandong by the Dodder plant the fruit has set on very well; the tree is loaded with quite large, shining yellow-green fruits.

Last month, during April 3, 4 and 5, flooding rains had been experienced at Merredin and surrounding districts. In some localities up to four and five inches of rain were recorded and the Quandongs at Merredin received this drenching after a terrifically hot summer, now followed by further good rains and very pleasant sunny weather.

On July 14 I searched at No. 1 group for young trees and found five poor looking examples about six inches high. On turning over the

soil, red and rich in a very wet place under a number of young trees, about four inches down I found a large number of germinating seeds. I counted 73. Some were lying above ground, in very moist conditions, lying in a covering of water, and all were attached to nuts. Other seedlings were found, 27 in all, unattached to nuts. I took one seedling and grew it in a glass jar with a mixture of leaves and soil. It flourished on a window sill for 15 months until a mischievous cat knocked it over.

On August 14 the Quandong at the Dodder plant was loaded with fruit, most of it half red and of a good size. Curiously, only one side of the tree, that nearest to the roadway, was bearing. On the far side, nearest to the heavy scrub, there were only two fruits. I suspect that the Dodder vine, which had twined all over the branches of the Quandong tree, may have been the cause of this.

August 29: Quandong trees that are in fruit in the district are mainly showing red patches on the fruit. A stand of trees on the York Road, near Chapman's farm where water flows across the road and appears, perhaps to carry superphosphate from the paddocks with it, are heavily fruiting, with large fruits with red patches on them.

October 8: Generally it seems to me that fruit is much scarcer this year than last season, even though there was so much heavy blossoming of the trees. The fruit is ripening earlier and very much larger than usual. All the fruit on the Quandong at the Dodder plant has ripened and fallen; this was the tree which was a late ripener last season.

October 26: All the fruit has apparently ripened and fallen from the trees for this season. All the trees examined are coming into blossom, including those that had just borne large amounts of fruit. The early season and short fruiting may have been the result of the heavy rains in May. There was no late fruiting.

1975

February 20: The Quandong tree at the Dodder plant is only just beginning to set fruit. The same is the case with the trees of the No. 1 group, where fruit appears to be sparse.

When No. 1 group was examined again on May 9 it was found that actually a fair amount of fruit had set, despite the earlier scanty blossoms. The fruit was of good size. There were some small trees from a few inches to six inches high at the bases of some of the trees.

On May 14 I examined Quandong trees on the Nungarin Road, about five miles north of Nokaning. A group of 128 trees examined in the winter of 1973 were seen to be well grown and healthy. Other trees here examined for fruit showed the majority were not bearing, although they looked healthy; only five trees in 20 mature ones were well covered with young well-grown fruit. Quandong trees on the York Road also showed the majority to be without fruit. Of 24 well-grown trees examined only four were bearing some fruit, but only sparsely.

On August 4 and 9 on Chandler and York Roads I examined 258 Quandong trees. Of these only four were fully loaded with fruit, seven had one or two fruits on each and one tree had a small amount of fruit.

On September 23 I examined the No. 1 group. Of 64 trees in the group 24 were well covered with fruit. Out of this number six trees were fruiting heavily and several others had only one or two fruits on each. Individual trees appear to bear some fruit each year, a light crop followed by a heavy crop and so on. Other trees do not appear to bear fruit at all. Rainfall has been light but constant, with a pleasant, mild spring. There were not many frosts and the weather was generally calm.

November 11: Quandong trees on the Golf Road, Merredin, flowering profusely, with a fragrant scent. November 18: Quandongs in blossom on the York Road.

December 11: The Quandong trees at No. 1 group are nearly all in blossom, some heavily. A tree which I had referred to as "barren" is now heavily in blossom, for the first time for some years.

On December 12 I examined the Dodder plant Quandong and found it to be heavily in blossom. However the Dodder vine, which is laden with large dull green berries, is taking its toll of the tree. Its crown is now almost bare of leaves where the Dodder is entwining it; only the outer branches have leaves and blossoms.

A culinary note: Quandong fruit is very nice to eat, and many delicious and interesting recipes may be made from them. Quandong pies, with cream added, are delicious. Quandong puree, jam, preserves and chutney have all been tried and found very good. Recently Dr. Buttrose sent me a jar of dried Quandongs in sweet sherry, to be eaten direct or sweetened with sugar and cream added. They were delicious. The kernel from the Quandong nut is also nice to eat and may be roasted lightly in cooking oil and salt sprinkled over them.

BIRDS OBSERVED ON A VISIT TO BERNIER ISLAND IN SEPTEMBER 1977

By MAX HOWARD, Carnarvon.

INTRODUCTION

Bernier Island is the northern-most island in the Shark Bay group of islands and together with Dorre Island it forms an "A" Class reserve, number 24869 for the conservation of flora and fauna. It lies about 30 miles west of Carnarvon.

On September 20, 1977, Michael and Irene Morcombe and myself departed Carnarvon on the Nor-West Whaling boat *Boullanger*, to attempt to photograph if possible the Osprey (*Pandion haliaetus*) and the White-breasted Sea-Eagle (*Haliaeetus leucogaster*), which are abundant on the island. We arrived on the island at 1700 hours the same day, and camp was set up in the bay just north of Redcliff Point. We departed the island at 0730 hours on September 24.

The area searched from the campsite was about 2 miles north, 3 miles south and half mile west.

LIST OF BIRDS OBSERVED

Silver Gull, *Larus novaehollandiae*. The most common gull, found in large numbers around the shore line and offshore rocks.

Pacific Gull, *Larus pacificus*. Very common around shore line and offshore rocks. Very few immature birds sighted.

Pied Oystercatcher, *Haematopus ostralegus*. Appeared to be the more common of the oystercatchers. One nest located with one egg on the beach near campsite.

Sooty Oystercatcher, *Haematopus fuliginosus*. Several birds sighted on most days south of Redcliff Pt.

Osprey, *Pandion haliaetus*. Common on parts of the island visited, three pairs sighted within three miles of campsite. One pair attempted nest building and another nest located with two young about one month old.

White-breasted Sea-Eagle, *Haliaeetus leucogaster*. One nest containing two large young about two months old, located about half mile south of Redcliff Point.

Welcome Swallow, *Hirundo neoxena*. Very common on parts of island visited.

Australian Pipit, *Anthus novaeseelandiae*. Another common bird observed mainly on the beach at our campsite, and in the thicker scrub.

Little Falcon, *Falco longipennis*. One bird only observed flying south along cliff face on the first day of our visit. However it was heard calling on all subsequent days, and it was observed flying away from cliff face, just north of our campsite.